

What is claimed is:

1. A modified acetylcholine receptor subunit comprising an  $\alpha$  subunit of a vertebrate acetylcholine receptor having a region which is homologous with the amino acid sequence shown in SEQ ID NO: 1,

wherein at least one amino acid in the region of the  $\alpha$  subunit of the vertebrate acetylcholine receptor which is homologous with the amino acid sequence shown in SEQ ID NO: 1 is replaced by an amino acid which occurs at the identical position in the corresponding region of an  $\alpha$  subunit of an insect acetylcholine receptor, and wherein the replacement of the at least one amino acid in the region of the  $\alpha$  subunit results in a change of the amino acid sequence when compared with the amino acid sequence of the  $\alpha$  subunit wherein no replacement has occurred.

2. A modified acetylcholine receptor subunit according to Claim 1, wherein at least four amino acids in the region of the  $\alpha$  subunit of the vertebrate acetylcholine receptor which is homologous with the amino acid sequence shown in SEQ ID NO: 1 is replaced by the corresponding number of amino acids which occur at the identical positions in the corresponding region of an  $\alpha$  subunit of an insect acetylcholine receptor.

3. A modified acetylcholine receptor subunit according to Claim 1, wherein at least seven amino acids in the region of the  $\alpha$  subunit of the vertebrate acetylcholine receptor which is homologous with the amino acid sequence shown in SEQ ID NO: 1 is replaced by the corresponding number of amino acids which occur at the identical positions in the corresponding region of an  $\alpha$  subunit of an insect acetylcholine receptor.

4. A modified acetylcholine receptor subunit according to Claim 1, wherein the entire region of the  $\alpha$  subunit of the vertebrate acetylcholine receptor which is homologous with the amino acid sequence shown in SEQ ID NO: 1 is replaced by the corresponding region of an  $\alpha$  subunit of an insect acetylcholine receptor

5. A modified acetylcholine receptor subunit according to Claim 1, wherein the  $\alpha$  subunit of a vertebrate acetylcholine receptor comprises mouse, rat, chicken, zebra fish, rhesus monkey, bovine or porcine neuronal subunits.

6. A modified acetylcholine receptor subunit according to Claim 1, wherein the  $\alpha$  subunit of an insect acetylcholine receptor is the  $\alpha 2$  subunit or the  $\alpha 3$  subunit of *Myzus persicae*, or the  $\alpha 1$  subunit of *Heliothis virescens* or *Manduca sexta*, or the  $\alpha 1$ ,  $\alpha 2$  or  $\alpha 3$  subunit of *Drosophila melanogaster*.

7. A modified acetylcholine receptor subunit according to Claim 1, comprising the amino acid sequence shown in SEQ ID NO: 3.

8. A modified acetylcholine receptor comprising an acetylcholine receptor subunit according to Claim 1.

9. A modified acetylcholine receptor according to Claim 8, further comprising a mouse, rat, chicken, zebra fish, rhesus monkey, bovine or porcine  $\beta$  subunit.

10. A nucleic acid comprising a nucleotide sequence which codes for a modified acetylcholine receptor subunit according to Claim 1.

11. A nucleic acid according to Claim 10, wherein the nucleic acid comprises single-stranded or double-stranded DNA or RNA.

12. A nucleic acid according to Claim 11, wherein the nucleic acid comprises fragments of genomic DNA or cDNA.

5 13. A nucleic acid according to Claim 10, wherein the nucleotide sequence comprises the sequence shown in SEQ ID NO: 2.

10 14. A DNA construct comprising a nucleic acid according to Claim 10 and a heterologous promoter.

15 15. A vector comprising a nucleic acid according to any of Claim 10.

16 16. A vector according to Claim 15, wherein the nucleic acid is functionally linked to regulatory sequences which ensure expression of the nucleic acid in prokaryotic or eukaryotic cells.

17. A host cell containing a nucleic acid according to Claim 10.

20 18. A host cell according to Claim 17, wherein the host cell is a prokaryotic cell.

19. A host cell according to Claim 17, wherein the host cell is a eukaryotic cell.

20. A method for preparing a modified acetylcholine receptor subunit according to Claim 1, comprising the steps of :

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- a) cultivating of a host cell containing a nucleic acid comprising a nucleotide sequence which codes for an acetylcholine receptor subunit according to Claim 1, in a culture medium and under conditions which ensure expression of the nucleic acid, and
  - b) isolating the polypeptide from the cell or the culture medium.

10 21. A method for preparing a nucleic acid according to Claim 10, comprising the step of:

- (a) chemically synthesizing the nucleic acid, or
- (b) amplifying the nucleic acid by PCR.

15 22. A method for finding active ingredients for crop protection or active pharmaceutical ingredients for the treatment of humans or animals comprising the steps of:

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- (a) providing of a host cell according to Claim 17,
  - (b) cultivating of the host cell in the presence of one or more chemical compounds, and
  - (c) detecting altered conduction properties of acetylcholine receptors.

23. A method for preparing a modified acetylcholine receptor subunit according to Claim 1, comprising the steps of

- 25
- a) expressing of a nucleic acid comprising a nucleotide sequence which codes for an acetylcholine receptor subunit according to Claim 1 in an in vitro system, and
  - c) isolating the polypeptide from the in vitro system.

30 24. A modified acetylcholine receptor comprising an acetylcholine receptor subunit of Claim 7.

25. A modified acetylcholine receptor subunit according to Claim 1, wherein the modified acetylcholine receptor subunit displays greater sensitivity to imidacloprid as compared to an unmodified acetylcholine receptor subunit.

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26. A DNA construct comprising SEQ ID NO: 2 and a heterologous promoter.

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27. A vector comprising a DNA construct according to Claim 26.

28. A vector according to Claim 27, wherein the nucleic acid is functionally linked to regulatory sequences which ensure expression of the nucleic acid in prokaryotic or eukaryotic cells.

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29. A host cell containing a DNA construct according to Claim 26.

30. An isolated acetylcholine receptor comprising  $\beta$  subunit and an  $\alpha$  subunit, wherein the  $\alpha$  subunit comprises SEQ ID NO: 3.

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31. An isolated acetylcholine receptor comprising an  $\alpha$  subunit and a  $\beta$  subunit, wherein the  $\alpha$  subunit comprises a region having the same amino acid sequence as a region of an  $\alpha$  subunit selected from the group consisting of:

the  $\alpha 2$  subunit isolated from *Myzus persicae*,

the  $\alpha 3$  subunit isolated from *Myzus persicae*,

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$\alpha 1$  subunit isolated from *Heliothis virescens*,

the  $\alpha 1$  subunit isolated from *Manduca sexta*, and

he  $\alpha 1$ ,  $\alpha 2$  or  $\alpha 3$  subunits isolated from *Drosophila melanogaster*.

32. An isolated acetylcholine receptor according to Claim 31, wherein the  $\beta$  subunit is has the same amino acid sequence as a  $\beta$  subunit selected from the group consisting of:

the  $\beta 2$  subunit isolated from mouse,

5 the  $\beta 2$  subunit isolated from rat,

the  $\beta 2$  subunit isolated from chicken,

the  $\beta 2$  subunit isolated from dog,

the  $\beta 2$  subunit isolated from zebra fish,

the  $\beta 2$  subunit isolated from rhesus monkey,

10 the  $\beta 2$  subunit isolated from bovine, and

the  $\beta 2$  subunit isolated from porcine.